

SALMON AND STEELHEAD HABITAT LIMITING FACTORS

WATER RESOURCE INVENTORY AREA 28

**WASHINGTON STATE
CONSERVATION COMMISSION**

FINAL REPORT

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EXECUTIVE SUMMARY

Section 10 of Engrossed Substitute House Bill 2496 (Salmon Recovery Act of 1998), directs the Washington State Conservation Commission, in consultation with local government and treaty tribes to invite private, federal, state, tribal, and local government personnel with appropriate expertise to convene as a Technical Advisory Group (TAG). The purpose of the TAG is to identify habitat limiting factors for salmonids. Limiting factors are defined as “conditions that limit the ability of habitat to fully sustain populations of salmon, including all species of the family Salmonidae.” The bill further clarifies the definition by stating, “These factors are primarily fish passage barriers and degraded estuarine areas, riparian corridors, stream channels, and wetlands.” It is important to note that the responsibilities given to the Conservation Commission in ESHB 2496 do not constitute a full limiting factors analysis.

This report is based on a combination of existing watershed studies and the personal knowledge of the TAG participants. TAG members mapped fish distribution maps for coho, chinook, and chum salmon, and for winter and summer steelhead in Water Resource Inventory Area (WRIA) 28. Salmonid habitat limiting factors were identified for each major anadromous stream within WRIA 28.

WRIA 28 is located in Southwest Washington, with boundaries that extend to the western margins of the Wind River to the east, the Columbia River to the south, and the East Fork Lewis River to the north (see Map A-1). The inventory area includes the southern and eastern portions of Clark County and southwestern Skamania County. For purposes of this report WRIA 28 was divided into three major subbasins: the Lake River Subbasin, the Washougal River Subbasin, and the Bonneville Tributaries Subbasin. These drainages cover approximately 316,365 acres or 494 square miles and enter the Columbia River between river mile (RM) 87.6, at Lake River, and RM 142.3 near Bonneville Dam.

Three stocks of anadromous salmon, both winter and summer steelhead, and coastal cutthroat trout return to the rivers and streams of WRIA 28. Chinook salmon, chum salmon, and steelhead are listed as “threatened” by National Marine Fisheries Service under the Endangered Species Act. Coho salmon are listed as a candidate species, and coastal cutthroat are proposed for a “threatened” listing.

WRIA 28 Habitat Limiting Factors

There were a number of habitat limiting factors, and recommendations to address these factors, that apply across the entire WRIA including:

- Various land uses practices have negative impacts on habitat conditions for salmonids. If these impacts continue at the existing rate in many of the subbasins of WRIA 28, habitat degradation will outstrip any possible restoration strategy. The TAG suggests that critical areas ordinances be developed and/or updated to ensure protection of critical habitat for threatened and endangered salmonids.
- Stormwater in urban areas contributes to increased peak flows, leading to bed and bank scour and channel shifting. These inputs also contribute fine sediments and

reduce water quality. Where possible, alter stormwater facilities to reduce direct runoff to streams and increase infiltration. Protect and enhance wetlands and other water recharge areas.

- Almost every stream system within WRIA 28 has inadequate levels of large woody debris (LWD). Supplement LWD in appropriate stream channels, to provide short-term habitat benefits. Protect and enhance riparian habitat to increase LWD supplies over the long-term.
- Riparian restoration is needed almost throughout WRIA 28. Many commercial forestlands are in the process of recovering from disturbances early in the last century. Other areas have reduced riparian function due to urban and rural development. Protect existing functional riparian habitat and restore those areas that have been degraded by past activities, starting with productive anadromous tributaries.
- The headwaters of most streams within WRIA contain the vast majority of functional habitat. These areas also provide cool, clean water, spawning sediments and woody debris that help buffer downstream land use activities. Focus on protecting these more pristine habitat reaches from additional land-use impacts.
- Elevated water temperatures are a problem in many stream systems within WRIA 28. Poor riparian conditions, low-flow problems, high width-to-depth ratios, and impounded water all contribute to elevated water temperatures. A comprehensive approach to water quality improvements is needed that addresses all of these related problems across the watershed.
- Water withdrawals, for both industrial and domestic uses, reduce instream flows and the habitat available for salmonids. Explore opportunities to protect and augment stream flows in WRIA 28 during low-flow periods.

Lake River Subbasin

This subbasin includes all streams that drain to Lake River including Salmon, Whipple, and Burnt Bridge Creeks. Most of these streams flow through highly urbanized areas of the City of Vancouver and Clark County. Extensive urban and rural development within the subbasin has degraded habitat in many of the stream systems. Stormwater impacts, loss of forest cover, altered riparian corridors, minimal instream habitat diversity, excessive impervious surfaces, high road densities, channelization and streambank hardening, flood control projects, and passage barriers have all contributed to the degradation of habitat conditions. For each of the following habitat categories the Technical Advisory Group (TAG) developed recommendations for addressing the major habitat limiting factors in the subbasin.

Access:

A number of passage barriers block access to potentially productive salmonid habitat. Assess and prioritize repair and/or removal of these passage barriers. Barriers on Whipple, Packard, and Baker Creeks are significant barriers that need repair.

Floodplain Connectivity:

Diking, streambank hardening, channelization, and channel incision has eliminated access to floodplain habitat and reduced the overwintering habitat in many areas of the subbasin. Substantial amounts of stream adjacent wetland habitats have also been eliminated within the subbasin. Habitat surveys in 1989 determined that the potential spawning capacity within the Salmon Creek watershed is much larger than the actual rearing capacity. Reestablish floodplain connectivity and protect floodplain wetlands, starting with the lower and middle reaches of Salmon Creek, along Burnt Bridge Creek, in upper Mill Creek, and within the Vancouver Lake lowlands.

Streambed Sediment Conditions:

Most stream systems within the subbasin receive excessive inputs of fine sediment. Stormwater, high road densities, and other related impacts from urbanization, agricultural activities, and the loss of riparian vegetation all contribute to sediment problems within the subbasin. Various stream channels within the subbasin, including Whipple Creek, Burnt Bridge Creek, Curtin Creek, and the upper reaches of Mill Creek are largely silt covered with only minimal amounts of spawning substrates. A comprehensive program to address these excessive fine sediment inputs is needed.

Channel Conditions:

Almost throughout the subbasin, functioning Large Woody Debris (LWD) is scarce or absent. Consequently, pool habitat, spawning gravels, and habitat diversity are also scarce. Look for opportunities to enhance pool habitat, spawning habitat, and general habitat diversity by supplementing LWD. First focus LWD supplementation in the upper reaches of Salmon Creek, and Rock Creek where a majority of the quality spawning and rearing habitat in the subbasin occurs.

Riparian Conditions:

Riparian conditions are generally poor throughout the Lake River Subbasin and riparian restoration is needed along almost all streams. Only a few areas within the subbasin have fairly high quality riparian habitat. In general these occur in the upper reaches of Salmon Creek, Rock Creek, and Morgan Creek. Protection and enhancement of this functional riparian habitat should become a high priority.

Water Quality:

Serious water quality problems plague most streams within the subbasin. Elevated water temperatures are the most serious concern in many areas of the subbasin. Poor riparian conditions, low flows, stormwater and road related issues, impoundments, and impervious surfaces all contribute to elevated water temperatures. Water quality improvements will likely need to address all of these contributing factors before substantial improvements will occur.

Water Quantity:

Both elevated peak flows and low flows are considered limiting factors for salmonids in the Lake River Subbasin. Urbanization and other land uses have left almost the entire subbasin hydrologically immature. As such, the streams are likely subjected to increased

peak flows that can cause bed and bank scour and channel shifting to the detriment of egg and fry survival. Similar to water quality problems, there are a number of factors contributing to both elevated and low flow problems within the subbasin that will need to be addressed before improvements in streamflow will occur.

Biological Processes:

Escapement for most anadromous fish is well below historic numbers and the lack of carcasses contributing nutrients to stream systems may be limiting production. Additionally, habitat alterations, non-native introductions, and hatchery practices influence competitive interactions and ecological processes in the Lake River Subbasin. TAG members expressed concern over the lack of information on warm water predators and their potential impact on salmonids within Lake River. Also, exotic species like reed canarygrass and Himalayan blackberries have invaded many of the tributaries within the subbasin. The dense canopy and litter layer associated with these species precludes the reestablishment of riparian forest. Remove these invasive species and reestablish native riparian plants wherever possible.

Priority Habitats In Need Of Protection:

- New spawning grounds for chum were recently discovered along the northern Columbia River shoreline near the I-205 Bridge where groundwater upwelling occurs. Identify the extent and condition of these chum-spawning grounds, along with the source of these springs, and protect from the area from future nearshore development and additional groundwater withdrawals.
- The upper reaches of Salmon Creek and Rock Creek provide the majority of quality spawning and rearing habitat in the watershed. Protection of these headwater reaches is the highest priority within the Salmon Creek system.
- Wetland habitat is quickly disappearing in the Lake River Subbasin. Protect and enhance existing wetlands, and identify areas where additional wetland habitat can be restored.
- An analysis of stream habitat and redd surveys determined that the potential spawning capacity within the Salmon Creek watershed is much larger than the actual rearing capacity. Protection and enhancement of potential rearing habitat for coho, steelhead, and/or coastal cutthroat should provide substantially benefit for salmonid production in this stream system.

Washougal River Subbasin

Past natural and anthropogenic disturbances have had significant impacts on habitat conditions within the subbasin. The Yacolt Burn, forestry practices, splash and hydroelectric dams, road construction, mining, residential and industrial development, water withdrawals, and industrial pollution from paper mills have all altered habitat conditions within the subbasin. While some habitat conditions have improved over time, other habitat conditions have been much slower to recover from past impacts.

Many reaches of the mainstem Washougal and its tributaries still lack adequate structural LWD, spawning gravels, and quality pool habitat. Culverts and dams still block passage

to critical and very limited tributary habitat. Stream adjacent roads continue to alter riparian function and stream hydrology, and contribute fine sediments to spawning gravels. Water withdrawals continue to limit available spawning and, especially, rearing habitat within the subbasin. Development continues to reduce critical floodplain and riparian functions. Recommendations for addressing the major habitat limiting factors in the subbasin include:

Access:

Steep gradients and numerous falls limit access to critical tributary spawning and rearing habitat in the Washougal River Subbasin. Artificial passage barriers further limit the habitat available. Reopen as much tributary habitat as feasible, starting with the removal or alteration of some major passage barriers such as the dam on Wild Boy Creek.

Floodplain Connectivity:

Floodplain connections have been lost along portions of the mainstem Washougal and its major tributaries. Floodplain development that eliminates critical salmonid habitat is still occurring within the urban areas of Washougal and Camas. Local jurisdictions need to update existing regulations to increase protection of the remaining floodplain habitat. Opportunities for restoration and enhancement of floodplain and side channel habitat occur on the mainstem Washougal River, along the lower reaches of the Little Washougal, in School House Creek, and in Slough Creek.

Streambed Sediment Conditions:

Stormwater inputs, all-terrain vehicle (ATV) use, vegetation control in power line corridors, stream adjacent roads, farming and other land uses contribute excessive fine sediment to stream systems within the Washougal Subbasin. Road related problems are especially apparent in the upper Washougal basin. Recommendations include:

- Local jurisdictions need to review and update erosion and stormwater measures and shoreline regulations to assure protection of aquatic resources from urban and rural development.
- Continue to develop educational programs and incentives programs for landowners to alter various land use activities that negatively impact riparian corridors and increase fine sediment inputs.
- Fence cattle out of stream systems and restore riparian corridors to reduce erosion.
- Restrict ATV use to areas where impacts can be mitigated.

Channel Conditions:

Almost throughout the subbasin, functioning LWD is scarce or absent. The lack of LWD, combined with the hydrologic impacts of the Yacolt Burn and subsequent logging, have left many of the stream channels in the Washougal scoured to bedrock and without adequate spawning gravels or pool habitat. The lack of LWD was considered one of most significant limiting factor in the Washougal Subbasin. Supplementation of LWD is needed in specific areas to provide short-term benefits; however, long-term LWD recruitment is needed to maintain the benefits.

Riparian Conditions:

Riparian conditions are slowly improving within the Washougal River Subbasin, and unlike the more developed Lake River Subbasin, there are some fairly extensive areas with “good” riparian conditions in the Washougal River Subbasin. These areas are almost all located in the upper reaches of the mainstem Washougal and its tributaries on public or private industrial lands. Protection of these somewhat healthy riparian areas is critical to salmon recovery efforts in the subbasin. Restore degraded riparian habitat along the more developed lower reaches.

Water Quality:

While some major water quality issues in the lower river have been largely resolved over the last few decades, various water quality problems continue to plague the watershed. Elevated water temperatures remain a serious concern in many areas of the Washougal River Subbasin. Poor riparian conditions, low streamflows, stormwater and road related issues, impoundments, recreational impacts, and a channel scoured to bedrock all contribute to elevated water temperatures. Only a concerted long-term effort to address these related problems will reduce water temperatures and increase water quality in the subbasin.

Water Quantity:

Both elevated peak flows and low flows are considered limiting factors for salmonids in the Washougal River Subbasin. All but the upper reaches of the subbasin are hydrologically immature. Streams are subject to increased peak flows that can cause bed and bank scour and channel shifting to the detriment of egg and fry survival. Reduction of peak flows requires maintenance of mature forest cover in the subbasin and a reduction in stormwater impacts. Water withdrawals from Jones, Boulder, and Lacamas Lake reduce already low summer streamflow within the Little Washougal watershed and Lacamas Creek. The City of Camas and the Camas paper mill need to reduce the impacts of their water withdrawals on listed salmonids. Low summer flows, combined with high public use above Dugan Falls, also negatively impacts the adult population of summer steelhead through harassing and/or killing of holding fish. Reduce these impacts through increased public education and outreach, additional enforcement of existing regulations, and creation of sanctuaries for steelhead in critical holding areas within the upper Washougal River.

Biological Processes:

Escapement for most anadromous fish is well below historic numbers and the lack of carcasses contributing nutrients to stream systems may be limiting production. Assess the potential for carcass placement projects within the subbasin to increase nutrient levels and potentially productivity. TAG members expressed concerns about warm-water predators in the lower river and the impact of hatchery fish on stocks of summer steelhead within the subbasin. Hatchery operations need to review and update their plans to protect native stocks of salmon and steelhead.

Priority Habitats In Need Of Protection:

- The upper reaches of the Washougal River mainstem and its tributaries contain some of the best, most functional habitat within WRIA 28. Cool, clear water from these reaches buffers downstream impacts to water quality, and somewhat healthy riparian areas provide LWD recruitment to downstream reaches. Protect these streams that provide some of the best remaining habitat for summer steelhead stocks in the lower Columbia River.
- Most of the functional habitat within the Little Washougal River, and the North Fork Washougal also occurs within the headwaters. Protection and enhancement of these headwater reaches will benefit multiple stocks of salmon, steelhead, and coastal cutthroat trout.
- A substantial amount of the floodplain and side-channel habitat within the Washougal Subbasin has been lost or disconnected from the streams. Protection and enhancement of these habitats is critical for salmonids rearing within the subbasin.
- Urban and rural development within the Washougal Subbasin has also substantially increased impervious surfaces and reduced forest cover. Protection and enhancement of existing wetland habitat anywhere in the subbasin would provide multiple benefits for salmonids, especially within the Little Washougal and Lacamas Creek watersheds.

Bonneville Tributaries Subbasin

A number of the Bonneville Subbasin tributaries fall within the Columbia River Gorge National Scenic area and are protected from future development pressure. However, timber harvests, transportation corridors, passage barriers, and rural development have all contributed to habitat degradation in the subbasin, and smaller communities are rapidly developing. Recommendations for addressing the major habitat limiting factors in the subbasin include:

Access:

Most of the streams within this subbasin contain only a limited amount of lower gradient habitat for spawning and rearing of anadromous salmonids, located mainly in the lower reaches. The railroads, State Route (SR) 14, dikes, and other artificial structures reduce or eliminate access to some of the most productive habitat within the subbasin, as well as reduce overall habitat quality. Restore passage, and the natural hydrology and sediment transport within these streams wherever feasible.

Floodplain Connectivity:

There is only a limited amount of low gradient floodplain and side-channel habitat available within the Bonneville Tributaries Subbasin. Transportation corridors and other development along the Columbia have reduced or eliminated already limited floodplain habitat in many of these stream systems. Where possible, increase the amount and quality of floodplain habitat in the lower reaches of these smaller tributaries.

Streambed Sediment Conditions:

Fine sediment conditions within Gibbons Creek and its tributaries are “poor” and likely a major limiting factor. Fine sediments have also accumulated in the spring fed areas of

Duncan Creek. Spawning substrates within the springs need cleaning now that the area is accessible to “threatened” chum salmon. Stream adjacent roads also likely contribute excessive fine sediments to Hardy, Woodward, and lower Duncan Creeks.

Heavy loads of coarse sediments are deposited where the streams emerge from steep canyons in the Gorge. To some degree this is a natural process, and to some degree these sediment loads have increased due to land use activities and artificial structures within the subbasin. Culverts along SR 14 and the railroads exacerbate this natural condition as they alter or constrict the movement of coarse sediments down through these systems. Restore the natural hydrology and movement of sediments through these stream systems.

Channel Conditions:

Almost throughout the subbasin, functioning Large Woody Debris (LWD) is scarce or absent. Consequently, pool habitat and habitat diversity are also scarce. LWD supplementation in the lower reaches of most stream systems would enhance pool habitat, spawning habitat, and general habitat diversity in the short-term.

Riparian Conditions:

Riparian conditions are poor along almost every stream within the subbasin, especially along the lower reaches with productive anadromous habitat. Protection of existing mature riparian habitat in the upper reaches and restoration of the lower reaches is a high priority within the subbasin. Target riparian restoration efforts along the most productive and/or degraded streams including the lower reaches of Hardy, Hamilton, Lawton, and Woodward Creeks.

Numerous stream adjacent roads reduce riparian functions along Woodward Creek and Duncan Creek. Where feasible, abandon and/or repair these roads to provide at least a minimal riparian buffer along anadromous streams.

Water Quality:

Other than some limited data on Gibbons, Campen, and Hardy Creeks, water quality data is lacking within the Bonneville Tributaries Subbasin. Water temperatures and fecal coliform exceed state standards in Gibbons and Campen Creeks. Ecology is implementing a TMDL process for these creeks to address existing water quality problems. Water quality monitoring is needed for other streams within the subbasin. Protect and enhance riparian habitat in headwater reaches to help reduce downstream water temperatures. Develop stormwater facilities and ordinances in the City of North Bonneville to protect critical spawning habitat for chum salmon.

Water Quantity:

Both elevated peak flows and low flows are considered limiting factors for salmonids in the Bonneville Tributaries Subbasin. Urbanization, forestry, agriculture, and other land uses have left portions of subbasin hydrologically immature. The rapid residential development occurring in the Gibbons Creek watershed and in the City of North Bonneville, adds to already high levels of impervious surfaces and the loss of forest cover

along these streams. Encourage land use and development that maintains and enhances forest cover, wetlands, and riparian vegetation, and reduces stormwater impacts.

Biological Processes:

Escapement for most anadromous fish is well below historic numbers and the lack of carcasses contributing nutrients to stream systems may be limiting production. Additionally, habitat alterations and non-native introductions influence competitive interactions and ecological processes in the Bonneville Tributaries Subbasin. Removal of reed canary grass from the Duncan Creek springs and reestablishment of native plant species is a high priority in the subbasin.

Priority Habitats In Need Of Protection:

- Protection of chum spawning areas in Hamilton and Hardy Creeks is one of the highest priorities within the subbasin, as well as in the entire lower Columbia River basin. Protection of these spawning sites requires protection of the headwaters of these streams to maintain good water quality and the natural hydrologic regime, and to minimize fine sediment inputs.
- Chum and fall chinook spawn in the mainstem of the Columbia River just downstream of Bonneville Dam near Ives and Pierce Islands. These spawning sites provide critical habitat for listed chum species in the lower Columbia, especially during dry years when low flows limit the availability to tributary spawning habitat.
- Hundreds of chum salmon once returned to spawn within the spring-fed areas along Duncan Creek. With the construction of a new passage facility, chum salmon again have access to this productive tributary. Protect and enhance of these springs.
- The upper reaches of Gibbons Creek have the potential to support a healthy population of coho and steelhead. Protect and enhance riparian corridors and LWD supplies.